TRANSFER STATION AND RECYCLING PLANT COST ANALYSIS

Prepared for:

New Brunswick Department of the Environment

Prepared by:

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August, 1990

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August 7, 1990

90-0612-02

Mr. Robert Lutes
Manager
Solid Waste and Recycling Section
Operations Branch
NB Department of the Environment
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Dear Bob:

Please accept this report entitled: Transfer Station and Recycling Plant Cost Analysis. Ten copies have been forwarded to you for your use and distribution.

It has been our pleasure to have worked with you and Pegi on this project, and we look forward to working with you again on future projects.

Thank you.

Yours truly,

TR Holyoke

Tim R. Holyoke, M.Sc.Eng.
Manager of Special Projects

/ks

cc. Ms. Pegi McKay, P.Eng.

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1.0 INTRODUCTION

1.1 Study Purpose

The purpose of this study has been to provide an estimate of the unit costs of transfer station facilities and operations. The "typical" design throughput of the transfer station is assumed to be 20,000 te per annum. Two options are being considered in this evaluation:

1. a 20,000 tonne enclosed transfer station; and
2. a 20,000 tonne enclosed transfer station with a joint recycling operation.

1.2 Analysis Assumptions

All costs are given in 1990 dollars. A capital amortization period of 15 years has been used. A 12 percent interest rate has been assumed, which may appear low at this time, but reflects a more longer term average rate.

The facilities, equipment and staffing have been estimated to best reflect the levels of operations required to serve a population generating 20,000 tonnes of solid waste per annum. Costs of the facilities and equipment have been acquired from manufacturers and distributors serving New Brunswick. It has been assumed that most of the residential wastes will be collected curbside by collection vehicles, although small vehicle drop-off bays have been provided.

Six common recyclable waste items have been assumed for the recycling operation. Normal recycling program participation and capture rates have been assumed. The proportions of the six recyclable waste items in the waste stream have been based on the Atlantic Region sample of the Bird and Hale Ltd. report on municipal refuse statistics for Environment Canada in 1979.

2.0 TRANSFER STATION COSTS

2.1 Facility and Operations Plan

Figure 2.1 presents a conceptual facility floor plan for an enclosed transfer station of sufficient size to accommodate a throughput of 20,000 tonnes per annum. This operation involves all residential, commercial and light industrial wastes dropped off by various collection vehicles and transferred on to a disposal site in 110 c.y. open-top trailers.

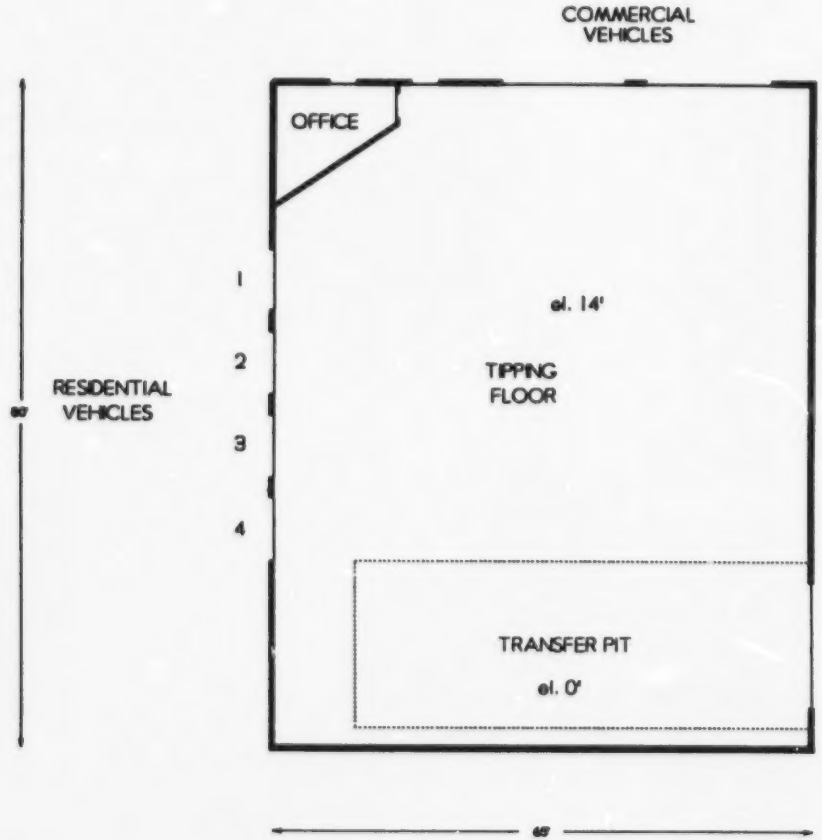
This transfer station will accommodate commercial and residential collection vehicles at one end, at-grade with the tipping floor. Small vehicle waste deposit bays are provided at-grade with the tipping floor at the front side of the building. A small rubber tired bulldozer would push the wastes from the tipping floor directly into a transfer trailer parked in a recessed transfer pit in the floor at the opposite end of the building. The bulldozer provides some compaction of waste in the trailers with a tamper attachment.

Transfer pit access for the transfer trailers is provided from the back side about 14 feet below the tipping floor surface. The site and on-site roads would be graded as such to permit proper vehicular traffic flows and tractor-trailer turning radii and acceleration grades. During capacity operations an average of 5 or 6 truckloads per day will be transferred from the station to a disposal site, depending upon the degrees of compaction and density and the season of incoming wastes.

The transfer station would be a 5,200 square foot steel panelled light gauge structural steel frame insulated building on a 12 inch reinforced concrete slab floor. All vehicle circulation areas and access routes would be paved. An estimated 10 acres of land would be required to provide for tractor-trailers and other vehicular traffic circulation, as well as sufficient peripheral site buffer zones.

2.1 Capital and Operating Costs

Table 2.1 presents a breakdown of the capital and operating costs associated with the transfer station operations. It is important to note that these costs include only the transfer station operations --- costs of waste collection and costs of delivery of transferred wastes are not included.



FGA FIANDER-GOOD ASSOCIATES LTD.		Date: 06/1990
Project Title: TRANSFER STATION COSTING		
Drawing Title: FIGURE 2.1 TRANSFER STATION OPTION CONCEPTUAL PLAN		
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Table 2.1

BREAKDOWN OF TRANSFER STATION COSTS ($ 1990)

A.	CAPITAL COSTS:		$1,037,000	
	1. Facility:		725,000	
	- Building:	$525,000		
	- Site Work:	125,000		
	- Land	75,000		
	2. Equipment*:		312,000	
	- Bulldozer (10th):	$46,000		
	- Weigh Scales/Station:	50,000		
	- 3-Transfer trailers (8th):	216,000		
	3. Amortized Capital Costs:			$135,945
B.	OPERATING COSTS (per annum):			209,000
	1. Staff:		$142,000	
	- 1 Manager:	$40,000		
	- 1 Equipment Operator:	24,000		
	- 2 Station/scales operators:	36,000		
	- 1 Secretary/Receptionist	14,000		
	- Employee Benefits	28,000		
	2. Operations:		67,000	
	- Utilities/Fuel:	$15,000		
	- Building/Site Maintenance:	5,000		
	- Equipment Maintenance:	20,000		
	- Administration/Overhead, etc.:	27,000		
C.	TOTAL ANNUAL CAPITAL AND OPERATING COSTS:			$344,945

* Equipment items have been amortized over 15 years, or for their service life, as indicated by their respective replacement years in brackets.

3.0 TRANSFER STATION WITH RECYCLING OPERATION COSTS

3.1 Facility and Operations Plan

Figure 3.1 presents a conceptual facility floor plan for a transfer station with a joint recycling operation. The total waste throughput of the joint operations facility is 20,000 tonnes per annum.

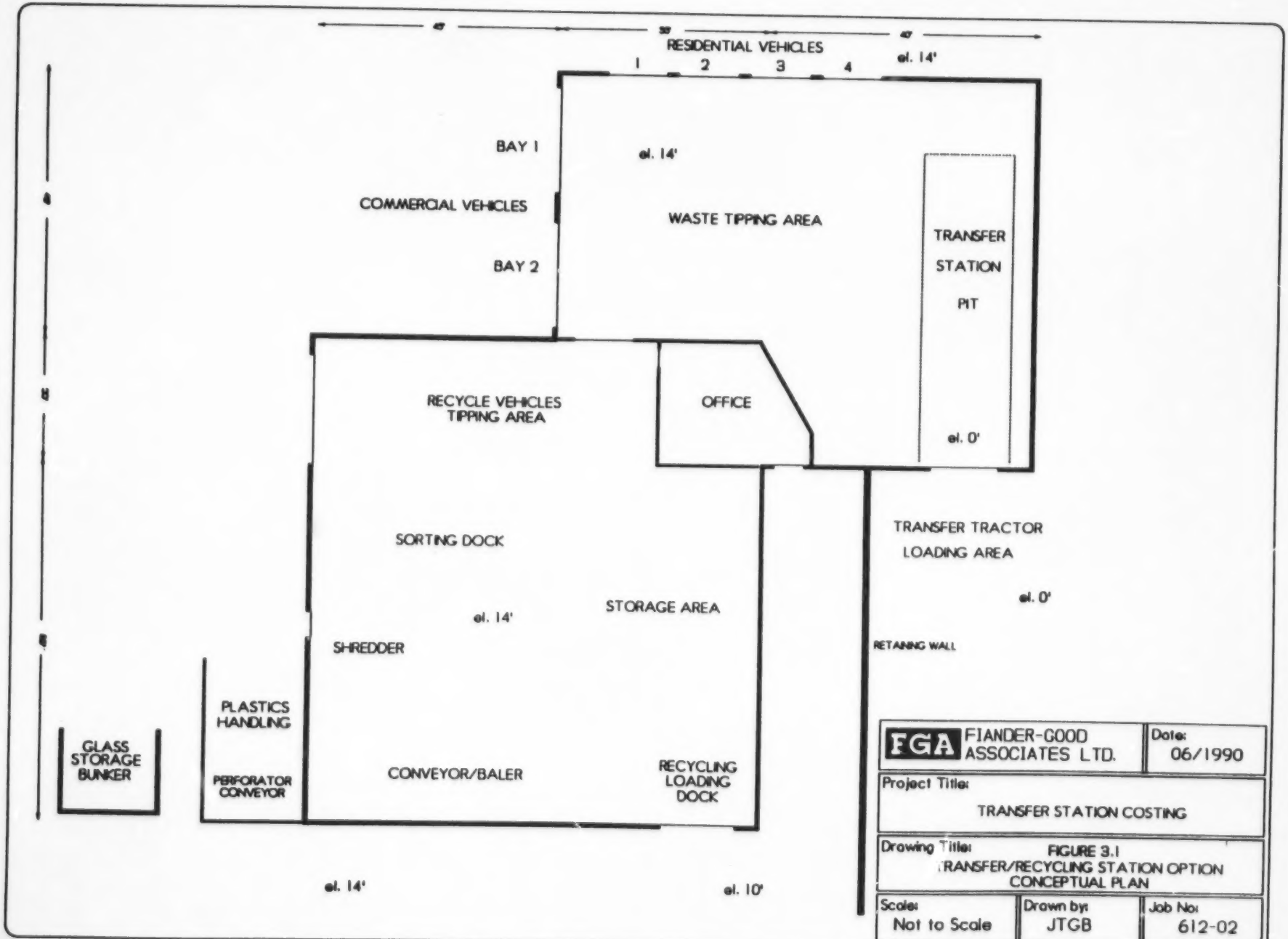
The recycling operation involves six waste items: glass, aluminum cans, plastics (co-mingled), newsprint, cardboard and fine paper, which constitute about 40 percent of the waste stream. Given the percentage content of these items among the typical solid waste stream:

- participation and capture rates of 75 and 70 percent for glass, aluminum cans, plastics and newsprint collected from residents in blue boxes at their curbside;
- 70 percent participation and 70 percent capture of fine paper collected from commercial offices, etc.; and
- 20 percent participation and 20 percent capture of cardboard dropped off by commercial participants;

It has been estimated that 11.7 percent of the 20,000 tonnes, or 2,340 tonnes of recycled wastes will be handled in the recycling part of the facility. This will reduce the other non-recycled wastes for transfer to 17,660 tonnes per annum.

The transfer component of the facility will operate in the same manner as it would as the sole facility described in the previous chapter. It will remain the busiest activity for traffic production and waste throughput. A connecting doorway to the transfer station will allow a loader from the recycling operation to move rejected items to the transfer tipping floor for transfer to a disposal site. Common office and washroom facilities are provided to both operations. Otherwise, the two operations will have very little interaction. With the recycling items removed from the waste stream, the average number of transfer truckload activity will be reduced to 4 or 5 loads per day.

The recycling plant will produce bales of all recycled items except glass. Glass will be sorted and stored in a concrete bunker outside the plant for loading by a loader into tandem axel dump trucks, as a load size accumulates. Plastic bottles will be stored in a shed adjacent to the building and will be run through a hopper/perforator system and conveyed onto the baler as a bale load accumulates. Aluminum cans will be stored in containers until baled. Plastic and aluminum can bales can be stored in the open, outside of the facility, if necessary for interior space, until a truckload of bales have accumulated.


RESIDENTIAL VEHICLES
1
2
3
4
el. 14'
BAY 1
COMMERCIAL VEHICLES
BAY 2
el. 14'
WASTE TIPPING AREA
TRANSFER
STATION
PIT
el. 0'
RECYCLE VEHICLES
TIPPING AREA
OFFICE
SORTING DOCK
el. 14'
STORAGE AREA
SHREDDER
TRANSFER TRACTOR
LOADING AREA
el. 0'
RETAINING WALL
PLASTICS
HANDLING
GLASS
STORAGE
BUNKER
PERFORATOR
CONVEYOR
CONVEYOR/BALER
RECYCLING
LOADING
DOCK
el. 14'
el. 10'
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Drawing Title:
FIGURE 3.1
TRANSFER/RECYCLING STATION OPTION
CONCEPTUAL PLAN
Scale:
Not to Scale
Drawn by:
JTGB
Job No:
612-02

The principal operations inside the facility involve a tipping area for recycle vehicles, the conveyor/hopper/baler system, a raised paper sorting dock, a paper shredder, sorted and baled paper storage area, and a recycled material loading dock. The recycle tractor-trailer floor will be flush with the plant floor for easy and efficient fork lift loading of the bales. The recycling operation at capacity will generate an average of 2 or 3 truckloads per week of outgoing items.

The transfer and recycling station would be a 10,175 sq. ft. steel panelled light gauge structural steel frame insulated building on 12 inch reinforced concrete. All vehicular circulation areas and access routes would be paved. An estimated 12 acres of land would be required to provide for vehicular circulation and sufficient site buffer zones.

3.2 Capital and Operating Costs

Table 3.1 presents a breakdown of the capital and operating costs associated with the transfer and recycling station operations. These costs do not include the costs of waste and recycled items collection or the costs of waste transfer and shipment of recycled products. Only the transfer and recycling station operations are included in these costs.

Table 3.1

BREAKDOWN OF TRANSFER STATION WITH RECYCLING COSTS ($ 1990)

A.	CAPITAL COSTS:		$1,934,000	
	1. Facility:		1,282,000	
	- Building:	$1,050,000		
	- Site Work:	142,000		
	- Land	90,000		
	2. Equipment*:		652,000	
	- Bulldozer (10th):	$46,000		
	- Weigh Scales/Station:	50,000		
	3-Transfer trailers (8th):	216,000		
	Fork Lift (10th)	30,000		
	- Loader (10th)	75,000		
	- Bailer (10th)	125,000		
	- Shredder (10th)	34,000		
	- Conveyors, etc. (10th)	30,000		
	- 4 - Containers (5th)	8,000		
	- Recycle Van Trailer (8th)	38,000		
	3. Amortized Capital Costs:			$275,760
B.	OPERATING COSTS (per annum):			354,000
	1. Staff:		$218,000	
	- 1 Manager	$40,000		
	- 2 Equipment Operator	48,000		
	- 2 Station/scales Operators	36,000		
	- 3 Sorters	36,000		
	- 1 Secretary/Receptionist	14,000		
	- Employee Benefits	44,000		
	2. Operations:		136,000	
	- Utilities/Fuel:	$45,000		
	- Building/Site Maintenance:	10,000		
	- Equipment Maintenance:	35,000		
	- Administration/Overhead, etc.:	46,000		
C.	TOTAL ANNUAL CAPITAL AND OPERATING COSTS:			$629,760

* Equipment items have been amortized over 15 years, or for their service life, as indicated by their respective replacement years in brackets.

4.0 SUMMARY

Table 4.1 provides the summary of costs of the two transfer station options, conceptually designed to accommodate a population generating 20,000 tonnes of waste per annum. The options include:

1. an enclosed transfer station only; and
2. an enclosed transfer station with a recycling operation facility.

The total capital costs of these facility options are just over $1 million for a transfer station only, and just under $2 million for a joint transfer station and recycling plant facility. Their respective operational costs are $17.25 and $31.49 per tonne. These costs are over and above costs of waste collection to the station and delivery from the station and exclude any revenues from the recycled waste items.

Table 4.1

SUMMARY COSTS ESTIMATES OF TRANSFER STATION OPTIONS ($1990)

Option	Total Capital	Annual Operations	Annual Capital And Operations	Average Per Tonne
Transfer Station Only	$1,037,000	$209,000	$344,945	$17.25/te
Transfer & Recycling Station	$1,934,000	$354,000	$629,760	$31.49/te